MARICOPA ASSOCIATION of GOVERNMENTS

MAG ITS Strategic Plan Update

Technical Memorandum #9

- Training and Capacity Building Plan

Prepared by:

TranSmart Technologies, Inc. and

Kimley-Horn and Associates, Inc.

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Technical Memorandum No. 9

1. INTRODUCTION

Technical Memorandum No. 9, ITS Training and Capacity Building (TCB) Plan, contains an overview of the process of identifying short- and long-term professional capacity building needs to support continued ITS deployment and operations in the MAG region. This technical memorandum summarizes the activities conducted as part of Task 13 of the MAG ITS Strategic Plan Update. TranSmart Technologies, a subconsultant to Kimley-Horn and Associates, Inc. completed the following key activities as part of this task:

- Identify priority areas for ITS training, specifically aimed at public sector ITS professionals responsible for planning, deploying, operating, and maintaining transportation systems;
- Identify and list existing as well as potential or future resources to deliver training, including traditional (such as classroom-style) or innovative instruction methods (such as web-based training)
- Identify implementable, short-term strategies in line with regional ITS training needs, delivery requirements, and funding availability;
- Develop a long-term plan to address regional ITS TCB needs.

The MAG ITS Training and Capacity Building Plan needs to consider short-term strategies (from 2002-2006) based on available resources to facilitate the latest development of ITS programs and overall transportation projects throughout the region. In addition, it also needs to propose longer-term strategies (from 2007 to 2011), corresponding to the medium-term deployment timeframe, with considerations of the rapid evolution of computer and communications technologies. Both short-term and long-term capacity building strategies will prepare the transportation professionals and ITS champions in the MAG region with the knowledge and expertise to continue ITS design and deployment in support of long range regional goals.

1.1 Background

1.1.1 General Concept of Professional Capacity Building

The professional capacity building (PCB) is the process of developing new or enhancing existing knowledge, skills, and human resources that are required for successful performance in one's job. With the deployment of various ITS systems in the country, ITS PCB has become increasingly important. By utilizing electronics, communications, computer, and sensing technologies, ITS intends to increase safety, mobility, and efficiency of the surface transportation systems. To successfully deploy and operate regional ITS, it requires that transportation professionals at all levels develop and apply new competencies in their daily work activities. The recent technological revolution in the areas of electronics, telecommunications, and computing requires transportation professionals to receive further education and training, which will enable them to remain professionally current.

The United States Department of Transportation (USDOT) ITS Joint Program Office (JPO) has developed a series of documents for ITS Professional Capacity Building [1]-[4]. These documents have been used as major references for developing the ITS TCB Plan for the MAG ITS Strategic Plan Update.

1.1.2 Three PCB Building Blocks: Roles, Competencies, and Delivery Methods

There are three critical building blocks in ITS professional capacity building: recognizing ITS Team Roles, ITS Competencies, and Delivery Methods. The ITS Team Roles identify the range of ideal ITS functions and job positions within a transportation agency and/or on an ITS project team. The ITS Competencies are a set of applied knowledge and skills that support successful job performance in ITS. The Delivery Methods are the most accessible ways recommended for professionals to learn about ITS. From these three building blocks, the needs of ITS professional capacity building can be identified.

1.2 Goals and Objectives

ITS training and capacity building for transportation professionals is one of the key elements to ensure the success of ITS and transportation system design and operations. One objective of the MAG ITS TCB Plan is to outline short-term strategies to address the current ITS training and Capacity Building needs of agencies in the MAG region. The other objective is to identify long-term ITS training and capacity building goals for the region. In order to achieve these objectives, a framework for building ITS professional capacity for MAG and its partner agencies is illustrated in **Figure 1.1** and the detailed steps are outlined in the following:

- Identify key ITS roles, responsibilities, and desired knowledge levels for staff at agencies in the MAG region.
- Through a public sector survey of typical ITS areas for training and capacity building conducted in the MAG region, identify and prioritize the specific training and capacity building needs. The ITS knowledge areas are then ranked in terms of high, medium, and low priorities.
- Identify existing resources available nationwide for training and capacity building through a survey of the different programs offered by a variety of federal agencies, ITS professional organizations, and universities. Information includes training fee, course description, course objectives, and targeted audiences. The training course contact information is also provided.
- Identify the short-term goals and propose a training plan to match the needs and priorities against what is currently available.
- Address the regional ITS training and capacity building needs in a longer term to:
  - Help transportation professionals to understand the fast-moving technology through training and capacity building; and
  - Assist transportation professionals in managing ITS project deployment as well as longer-term operations.

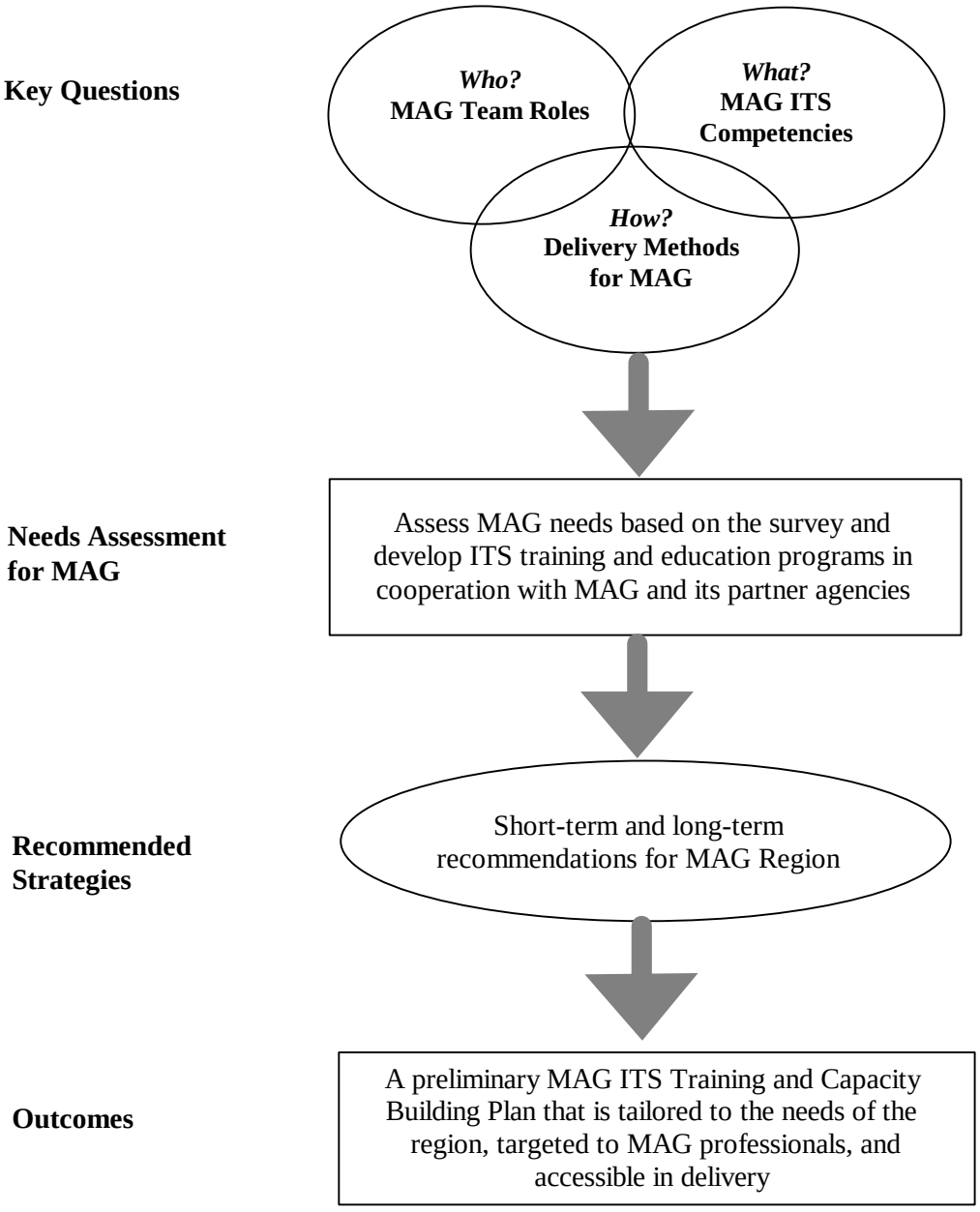

Figure 1.1 – Framework for Building ITS Professional Capacity in the MAG Region

2. SUMMARY OF SURVEY AND SURVEY RESULTS

To develop a short- and long-term MAG ITS TCB Plan, a survey was distributed in December 1999 to gather information from MAG and its partner agencies to identify regional and local ITS training needs. These needs were then prioritized based on existing resources such that training and capacity building strategies could be developed.

2.1 Survey Methods

The interviewees were professionals from public and private agencies in the MAG region who play key roles in various transportation and ITS programs. The survey questionnaire contained two parts:

(1) Training Needs, which included three questions:

- How is training best delivered to your staff/agency?
- What are the barriers to delivering this assistance to your agency?
- What best delivers this type of support?

(2) ITS Knowledge Areas that contain 39 knowledge areas for ITS projects. They are adopted from the national PCB survey conducted in 1998 by USDOT JPO [2].

Interviewees were asked to select knowledge areas that are critical to their position and to ITS in general. The interviewees also were asked to rank the top six knowledge areas with the highest priorities in ITS training and capacity building for their agency. The survey was designed to understand the types of training or staff development needs for agencies in the MAG region.

2.2 Analysis of Survey Results

A total of six completed and valid surveys were collected. Transportation professionals who returned the survey included Senior Transit Planner, Signal Systems Supervisor, and ITS Program Manager, etc. **Table 2.1** summarizes survey results on training needs. **Table 2.2** provides a summary of critical and prioritized knowledge areas identified by interviewees.

Table 2.1 – Summary of Training Needs Survey

Training Delivery Methods

A. How is training best delivered to your staff/agency?	
Delivery Methods	Percentage of Agreement as of the Best
▪ Workshops/classes/seminars	100%
▪ Manuals/guidelines	0%
▪ Scanning tours	0%
▪ On-the-job training/Peer-to-peer network	33%
▪ Professional associations	33%
▪ Other	0%

Barriers of Training Delivery

B. What are the barriers to delivering this assistance to your agency?
▪ Funding problems
▪ Meeting facility availability
▪ Staff availability
▪ Time for staff to attend
▪ Finding quality and relevant workshops
▪ Convenience of training locations

Best Training Providers

C. What best delivers this type of support?	
Providers	Percentage of Agreement as of the best
▪ Internal staff	17%
▪ Federal agencies	50%
▪ Universities	33%
▪ Commercial vendors	67%

Table 2.2 – Summary of Critical and Prioritized Knowledge Areas

Field	Knowledge Areas	A % chosen	B % chosen	C % chosen
Transportation Planning Process	1. Regional Concept of Operations	67	17	83
	2. Identifying Organizational Barriers and Managing Change	33	17	17
	3. Coalition Building with New Stakeholders	0	0	0
	4. Comparing/Combining ITS and Capital Improvements	50	0	50
	5. ITS Projects in the MPO Regional Trans. Plan/TIP	83	17	50
	6. Developing a Business Plan	17	0	17
	7. Data Sharing between Agencies	33	17	50
	8. Risk Management	17	0	0
	9. Partnerships – Structuring/Public/Private Agreements	17	17	50
	10. Public Relations	33	0	50
Project Planning/ Design	11. Technology Analysis – Range of Options	67	50	50
	12. Cost/Benefit Analysis	67	50	67
	13. Analysis of Existing ITS Infrastructure	33	0	50
	14. Using the National ITS Architecture for Planning	17	0	67
Procurement /Funding	15. Sources of Funding – Fed/State/Local/Private	33	17	67
	16. Writing Specifications – Technical and Legal Issues	50	17	50
	17. Procurement Options: Design / Build / Lease Agreements, Shared Resources Agreements and RFPs	33	0	67
Contracts Management	18. Managing Software Development and Costs	33	33	33
	19. Managing Contractors: Developers and System Integrators	33	17	17
Systems Engineering	20. System Analysis and Design	33	33	50
	21. Consistency with National ITS Architecture and Standards	17	17	67
	22. Requirements Management	33	0	17
	23. System Integration	67	17	50
	24. Quality Assurance	17	0	17
Telecommu-nications	25. Capacity Analysis – Transmission: Wireline v. Wireless	67	33	33
	26. Lease / Build Decision Making	67	33	17
Installation / Deployment	27. Acceptance Testing	17	33	17
	28. Use of Prototypes	33	0	50
	29. Training	17	0	17
Operations Center	30. Operations Center Staffing Requirements	50	0	17
	31. Management of an Operations Center	33	17	17
	32. Human Factors	33	0	33
Legal Issues	33. Privacy of Data and Identification	0	17	50
	34. Liability Issues	67	0	33
	35. Security Systems & Network Vulnerability	17	17	33
	36. Intellectual Property Rights	17	0	33
Maintenance	37. Software/Data Maintenance	50	17	33
	38. Inspection Procedures for ITS equipment / systems	33	0	17
Project Evaluation	39. Project Evaluation	50	0	67

Column A = For checkmarks indicating knowledge areas critical to interviewee's position.
Column B = For ranking knowledge areas (the top five are chosen).
Column C = For checkmarks indicating knowledge areas critical to ITS in general, from interviewee's perspective.

3. MAG ITS CAPACITY BUILDING NEEDS

3.1 Summary of Needs Prioritization

In order to develop short- and long-term training and capacity building strategies for ITS professionals in the MAG region, the training and capacity building needs have to be first identified and prioritized. Based on the survey results summarized in **Table 2.2**, the knowledge areas are prioritized and summarized in **Table 3.1**. The knowledge areas ranked from 1 to 6 in **Table A1** in **Appendix A** are identified with high priority in MAG ITS training and capacity building. The medium and low priority need are selected based on the ranking in **Table A1**. Rank 7 to 19 are categorized as medium priority needs and rank 24 to 39 are low priority needs. **Table 3.2** summarizes the high priority knowledge needs and their corresponding fields.

Table 3.1 – Prioritized Knowledge Areas

Priority	Rank	Knowledge Area #	Prioritized Knowledge Areas
High (Rank 1-6 in Table A1)	1	12	Cost/Benefit Analysis
	2	1	Regional Concept of Operations
	2	11	Technology Analysis – Range of Options
	4	5	ITS Projects in the MPO Regional Trans. Plan/TIP
	5	23	System Integration
	6	25	Capacity Analysis – Transmission: Wireline v. Wireless
Medium (Rank 7-19 in Table A1)	7	15	Sources of Funding – Fed/State/Local/Private
	7	16	Writing Specifications – Technical and Legal Issues
	7	20	System Analysis and Design
	7	26	Lease / Build Decision Making
	7	39	Project Evaluation
	12	21	Consistency with National ITS Architecture and Standards
	13	4	Comparing/Combining ITS and Capital Improvements
	13	7	Data Sharing between Agencies
	13	17	Procurement Options: Design / Build / Lease Agreements, Shared Resources Agreements and RFPs
	13	18	Managing Software Development and Costs
	13	34	Liability Issues
	13	37	Software/Data Maintenance
	19	9	Partnerships – Structuring/Public/Private Agreements
	19	10	Public Relations
	19	13	Analysis of Existing ITS Infrastructure
	19	14	Using the National ITS Architecture for Planning
	19	28	Use of Prototypes
Low (others in Table A1)	24	2	Identifying Organizational Barriers and Managing Change
	24	19	Managing Contractors: Developers and System Integrators
	24	27	Acceptance Testing
	24	30	Operations Center Staffing Requirements
	24	31	Management of an Operations Center
	24	32	Human Factors
	24	33	Privacy of Data and Identification
	24	35	Security Systems & Network Vulnerability
	32	22	Requirements Management

Table 3.1 – Prioritized Knowledge Areas

Priority	Rank	Knowledge Area #	Prioritized Knowledge Areas
	32	36	Intellectual Property Rights
	32	38	Inspection Procedures for ITS equipment / systems
	35	6	Developing a Business Plan
	35	24	Quality Assurance
	35	29	Training
	38	8	Risk Management
	39	3	Coalition Building with New Stakeholders

Table 3.2 – High Priority Knowledge Area Needs

Field	Knowledge Area Needs
Project Planning/Design	Cost/Benefit Analysis
Transportation Planning Process	Regional Concept of Operations
Project Planning/Design	Technology Analysis – Range of Options
Transportation Planning Process	ITS Projects in the MPO Regional Trans. Plan/TIP
Systems Engineering	System Integration
Telecommunications	Capacity Analysis – Transmission: Wireline v. Wireless

It is obvious that selecting available technologies, performing project quality control, and conducting cost/benefit analysis are the major concerns to ITS engineers and transportation professionals in the MAG region. These prioritized needs will be used to determine the short-term strategies for MAG ITS professional capacity building.

Furthermore, the MAG ITS capacity building survey results also are used to identify long-term ITS training goals in the MAG region. Column C in **Table 2.1** showed the statistical results of interviewees' choices of knowledge and skills that are important to ITS in general. The knowledge areas marked as "critical" by more than two-thirds of interviewees are treated as important to long-term MAG ITS training and capacity building. In addition to the MAG survey, the national PCB survey also identifies several critical knowledge areas for long-term ITS training in the MAG region. **Table 3.3** summarizes these observations. Although these are currently identified as medium or low prioritized needs, these knowledge areas could become the important considerations in the future; therefore, these knowledge areas will be used to determine the long-term strategies for MAG ITS professional capacity building.

Table 3.3 – Critical Knowledge Areas from Long-Term Perspective

	Knowledge Area Title	Level of Prioritized Needs (Short-Term)	Percentage of Interviewees Indicating Critical to ITS (Long-Term)*
From interviewees' perspective	Cost/Benefit Analysis	High	87%
	Regional Concept of Operations	High	67%
	Sources of Funding – Fed/ State/ Local/Private	Medium	67%
	Using the National ITS Architecture for Planning	Medium	67%
	Procurement Options: Design/Build/ Lease Agreements, Shared Resources Agreements and RFPs	Medium	67%
	Consistency with National ITS Architecture and Standards	Medium	67%
	Project Evaluation	Medium	67%
Other identified needs based on results of national survey in 1998	System Integration	High	50%
	Managing Contractors: Developers and System Integrators	Low	17%
	Software/Data Maintenance	Medium	33%
	Data Sharing between Agencies	Medium	50%

* Results based on Column C in Table 2.2

3.2 Range of Delivery Methods

The USDOT and its PCB partners identified four primary means of delivering professional capacity building in its 1998 survey. These delivery means are: training, formal education, technical assistance, and information outreach. Methods associated with each primary means for delivering ITS professional capacity building are listed as follows:

- Training
  - Traditional classroom style;
  - Computer-based training (CBT);
  - Satellite broadcast of a course presentation;
  - Web-based training (WBT); and
  - Job rotation of exchange program through/with agencies, professional associations, or private sector firms.
- Education
  - University and college lecture courses, labs and degree programs;
  - Certificate programs for continuing education;
  - Technical and vocational school courses, labs and degree programs; and
  - Journeyman and apprenticeship programs.

- Technical Assistance
  - Assistance from federal field staff;
  - Mentoring;
  - Consultant/Contractor assistance; and
  - Scanning review.
- Information Outreach
  - Web site with reports, information and access to technical assistance;
  - Papers on best practices, lessons learned, and successful approaches; and
  - Vendor-sponsored programs: displays, exhibits, training, electronic data library, and electronic newsletters.

Based on the 1999 MAG public sector survey results summarized in **Table 2.1**, all interviewees agreed that workshops/classes/seminars are the best methods for delivering training and capacity building. On-the-job training/peer-to-peer network and professional associations also have high preference. As to the best candidate for delivering training, 67% of interviewees selected commercial vendors, 50% preferred federal agencies, 33% preferred universities, and 17% preferred internal staff. This survey also identified potential barriers to delivering training, including availability of funding, staff availability, meeting facility availability, time, location, and quality of training. Obviously, commercial vendors are the major players of professional training providers. In addition, it was also commonly recognized that federal agencies and universities can best deliver training courses with regard to fundamental and innovative knowledge to meet the prioritized needs.

4. EXISTING RESOURCES FOR ITS TRAINING AND CAPACITY BUILDING

4.1 Training Courses

Several of the training courses provided by USDOT's Professional and Capacity Building Plan are structured in a traditional workshop/course manner. Some of these courses consist of a combination of lecture, computer-based exercises, and hands-on "tours" using CDs. Web sites and/or contact persons for existing training courses are listed below.

1. Public Sector:

   - Arizona Local Technical Assistance Program (LTAP):
     http://www.azltap.org/training/training.htm

   - USDOT-FHWA, National Highway Institute (NHI):
     http://www.nhi.fhwa.dot.gov *or contact*
     Lee Simmons (202) 366-8048, e-mail: lee.simmons@fhwa.dot.gov *or*
     Roger Petzold, Office of Intermodal and Statewide Planning (202) 366-4074,
     e-mail: roger.petzold@fhwa.dot.gov

   - ITS Joint Program Office:
     http://pcb.volpe.dot.gov/schedule.asp (or http://pcb.volpe.dot.gov/98catalg.htm)
     and http://www.its.dot.gov

- Intelligent Transportation Society of America:
  http://www.itsa.org/educate.html *or contact*
  Ria Melendez (202) 484-4547, e-mail: rmelendez@itsa.org

- National Transit Institute:
  http://www.policy.rutgers.edu/nti *or contact*
  Eric Bruun, (732) 932-1700 ext. 18, e-mail: ebruun@rci.rutgers.edu

- Transportation Safety Institute:
  http://www.tsi.dot.gov/DTI70/CATALOG.HTM*or contact*
  Vernon L. With, Manager (405) 954-3112

- Institute of Transportation Engineers:
  http://www.ite.org

2. Universities:

- Arizona State University: Intelligent Transportation Systems (CE 471/598): *contact* Mary Kihl (480) 965-6693, e-mail: mary.kihl@asu.edu

- Rensselaer Polytechnic Institute: contact William A. Wallace, e-mail: wallaw@rpi.edu
  Current courses include (will be available on CD-ROM)
  Electronic Toll and Traffic Management
  Video for Traffic Management
  Wireless Technology for ITS

- Institute of Transportation Studies Technology Transfer Program (provided by University of California – Berkeley): http://www.its.berkeley.edu/techtransfer

- Essential Competencies for the Transportation Professional of the Future (provided by University of Michigan): contact Thomas B. Reed, University of Michigan (734) 936-7622, e-mail: Tom.Reed@umich.edu. or http://its.engin.umich.edu/

4.2 Workshops

- Workshop on Models in Support of Advanced Traffic Management Systems (ATMS). For future scheduling information, contact Juan M. Morales, J.M. Morales & Associates. (703) 471-7031 e-mail: JMMassoc@aol.com *or* www.JMMassoc.com

- Build Your ITS Skills in Atlanta. For future scheduling information, contact Katrina Mayo, (202) 484-4549, e-mail: kmayo@itsa.org *or* Ria Melendez, (202) 484-4547, e-mail: rmelendez@itsa.org.

- Design and Application of Travel Demand Management (TDM) Techniques, Including Telecommuting (NHI Course 13369). Fee: N/A; Length: four Days; Coordinator: Harry Hersey (703) 235-0525 e-mail: harry.hersey@fhwa.dot.gov

- Design and Application of Travel Demand Management (TDM) Techniques, Not Including Telecommuting (NHI Course 13370). Fee: $225 per participant; Length: four days; Coordinator: Harry Hersey (703) 235-0525, e-mail: harry.hersey@fhwa.dot.gov

- Managing and Planning For Rural and Small Urban Systems Workshop. For future scheduling, contact Wyatt Osato at 414-227-3332, www.policy.rutgers.edu/nti/subject.htm#itechovr *or* www.uwm.edu/UniversityOutreach///catalog/Ctr_for_Transportation_Education/planning.htm

- Workshop on Impacts of e-Commerce on Transportation. Contact person: Richard Pain. For details, visit: http://www4.nationalacademies.org/trb/calendar.nsf

- 39th Annual Workshop on Transportation Law. Contact person: James McDaniel. For details, visit at: http://www4.nationalacademies.org/trb/calendar.nsf

- Other resources for new workshop information:
  http://www.dot.state.az.us
  http://www.policy.rutgers.edu/nti
  http://www4.nationalacademies.org/trb
  http://www.itsa.org/educate.html
  http://www.ite.org

4.3 Web-Based Training

Web-based training provides professionals with direct access to important ITS information from web sites. The following provides a sample of the major web sites for ITS training:

- Consortium for ITS Training and Education (CITE): http://www.citeconsortium.org
- USDOT ITS Joint Program Office: http://pcb.volpe.dot.gov/informational.asp
- Institute of Transportation Studies Technology Transfer Program provided by University of California – Berkeley: http://www.its.berkeley.edu/techtransfer
- Essential Competencies for the Transportation Professional of the Future provided by University of Michigan: contact Thomas B. Reed, University of Michigan (734) 936-7622, e-mail: Tom.Reed@umich.edu. or visit: http://its.engin.umich.edu/

4.4 Self Taught

For self-study purposes, materials of ITS PCB short courses and seminars can be downloaded in PowerPoint or viewed online, or provided with CD-ROM or printing materials. These courses and seminars are designed to be used for informational purposes and offer important opportunities to build awareness on critical ITS topics.

1. Download from Web sites

- USDOT ITS Joint Program Office: http://pcb.volpe.dot.gov/informational.asp

2. CD-ROM

- AZTech™. Project Archive & Project Report on AZTech™ ITS Model Deployment Initiative – *Phoenix Metropolitan Area*. April 1999. (This CD contains a complete documentation of the AZTech™ Projects – from the project's inception in September 1996, through its deployment in September 1998, and on through its post-deployment phase ending on March 31, 1999.)
- USDOT. The National ITS Architecture – A Framework for Integrated Transportation into the 21st Century (Version 3.0). 1999.
- USDOT-FHWA. Successful Approaches to Deploying a Metropolitan Intelligent Transportation System. 1999 (DOT-VNTSC-FHWA-98-7, FHWA-JPO-99-032, EDL Document Number 8483).
- USDOT-FHWA. ITS Greatest Hits. 1999 (FHWA-OP-99-028).
- USDOT-OMCS. CVISN Tool Kit. Version 2.1, January 2000.
- USDOT-FHWA. Intelligent Transportation System Awareness. Version 2.0, 1999 (FHWA-SA-99-016).
- USDOT-FHWA. Building Border Transportation Planning and Programming Study. 1996.

3. Reading Materials

- Electric Document Library
  http://www.its.fhwa.dot.gov/cyberdocs/welcome.htm
- National Transportation Library:
  http://ntl.bts.gov/ntl/browse.html
- Newsletter of the ITS Cooperative Deployment Network (ICDN):
  http://www.nawgits.com/icdn
- TRIS Online:
  http://trislive.bts.gov/search.cfm

4. Others

- Peer-to-Peer Program:
  http://www.its.dot.gov/metro-its/peer-t.htm
  The Intelligent Transportation Peer-to-Peer Program is an FHWA and FTA Technical Assistance Program that provides public sector transportation stakeholders with a convenient method to tap into the growing knowledge base of ITS experience and to receive short-term assistance. "Peers" can be from other transportation agencies, private consultants, academic, and other specialists in ITS.

5. SUMMARY OF THE MAG REGIONAL TRAINING AND CAPACITY BUILDING PROGRAM

The mission of the MAG ITS Training and Capacity Building Plan is to assist existing and future transportation professionals to develop the knowledge, skills, and abilities to plan, design, install, operate, manage, maintain and evaluate ITS more efficiently and effectively. Towards this end, the MAG ITS TCB Plan will continue to provide training and education that is ***tailored*** in its content, ***targeted*** to meet MAG and its partner agencies' needs, and ***accessible*** where, when, and as needed.

The short-term actions and recommendations outlined below are based on existing ITS TCB needs in the MAG region, available training materials and courses, and existing resources. Longer-term considerations are also presented, and should be evaluated once the TCB program is implemented.

These short-term strategies address the following:

- Identifying a local ITS TCB champion and assembling an ITS TCB working group to implement, monitor and promote the regional TCB Program (5.1);
- Scheduling and conducting identified courses and workshops to address the ITS training needs of staff in the region (5.2);
- Identifying opportunities to partner with national associations (such as ITS America and ITE) and Arizona University ITS research programs to schedule specialized symposiums, workshops, and courses (5.3);
- Maximizing use of available on-line training resources to provide flexible, cost-effective training, and professional development for ITS staff (5.4);
- Developing general guidelines for ITS staff in the region, addressing such issues as roles, functions, desired competencies, and recommended training activities (5.5); and
- Funding issues and requirements, as well as alternatives to maximize TCB dollars in the region (5.6).

5.1 Role and Responsibilities fo r the Regional ITS TCB Champion

To develop a structured, formal TCB program for the MAG region, it will require support from local ITS managers and professionals, as well as a "champion" who has a vested interest in the success of a regional training program.

As the MPO for the region, MAG and specifically the MAG ITS Committee, is the ideal entity to lead this effort. The MAG ITS Committee is an established group of traffic and ITS managers, transit agencies, public safety, and university interests throughout the region. This Committee meets monthly to discuss issues affecting regional traffic and ITS operations, as well as conduct regional ITS planning, programming, and coordination. It is recommended that a subcommittee or working group of the MAG ITS Committee be established to focus on developing and coordinating the MAG ITS TCB Program. In addition to the subcommittee, it is recommended that MAG appoint a coordinator that is on staff to serve as a central point of contact for the regional TCB program.

This subcommittee and on-staff coordinator will have responsibility for promoting regional training efforts for ITS staff at various agencies throughout the MAG region. A preliminary list of short-term recommendations to "jump start" the MAG ITS TCB Program includes:

- Coordinating with the Arizona LTAP to develop a schedule of NHI and other courses identified in this plan that are applicable to ITS in the MAG region;
- Working with LTAP to help advertise and promote the courses, as well as encouraging participation from MAG partner agencies;
- Coordinating with FHWA to secure sponsorship of ITS workshops and courses;
- Assembling and maintaining a library of current ITS documentation, reports, and CD-based instructional material for use by MAG partner agencies;
- Developing and maintaining a web page that provides an overview of the MAG TCB program, schedule and information about training activities, ITS TCB message boards and forums, as well as links to valuable ITS resources and web-based training tools;
- Identifying general staff categories in ITS-related positions at various MAG partner agencies as well as recommended qualifications and competencies for local agencies to use as a guideline for training existing staff as well as hiring new staff;
- Implementing a regional ITS Peer-to-Peer program based on the FHWA/FTA model to match up local professionals and experts with training or informational needs of MAG partner agencies;
- Closely coordinating with ITS programs at Arizona's universities (University of Arizona, Arizona State University, and Northern Arizona University) to document and share information about current research projects, seminars, and coursework; and
- Developing and maintaining a database of addresses (physical as well as e-mail) of local ITS personnel and professionals to use to distribute information about upcoming workshops, seminars and ITS activities.

5.2 ITS Courses and Workshops

Surveys submitted as part of the development of the MAG TCB Plan indicated a strong preference for training workshops and classrooms. These forums provide an opportunity to reach many professionals in the region in a structured workshop environment. Instructors are recognized experts in their respective fields, and often bring "big picture" and real-world application perspectives to the workshops. This method of training also allows ITS staff to make valuable contact with their peers which helps to foster cross-jurisdictional relationships among professionals in the region.

Based on the priority training and knowledge areas identified by the MAG stakeholders, the following courses are recommended as part of the MAG TCB program. Unless otherwise noted, these are workshop/classroom format that range from one to four days, and vary in cost. **Appendix B** provides more detail about course content, fee, professional credit hours, scheduling information, contact names and phone numbers, as well as a more detailed listing of available course titles.

Cost/Benefit Analysis

Value Engineering Workshop
ITS Deployment Analysis Systems (IDAS)
ITS and the Transportation Planning Process

Regional Concept of Operations
Freeway Traffic Operations
Deploying Integrated ITS – Metropolitan/Rural
Computerized Traffic Signal Systems

Technology Analysis/Range of Options
NTCIP and ITS Standards – What Do They Mean for You?
Procuring New Technologies for Transit
Telecommunications for ITS Professionals
Lessons in Intelligent Transportation Systems Procurement
ITS Applications and Traffic Management (web-based)

ITS Projects in the MPO Regional Transportation Plan/TIP
ITS for Transit: Solving Real Problems
Deploying Integrated ITS: Metropolitan
Statewide and Metropolitan Transportation Programming
ITS and Transit Management

System Integration
Deploying Integrated ITS: Metropolitan and Rural
Interoperability – ITS System Architecture and Standards (web-based)
Shared Resources for Telecommunications
Integrated Transportation Information System
System Integration for ITS Professionals

Capacity Analysis – Transmission: Wireline v. Wireless
ITS Telecommunications Overview
Wireless Technology for ITS (college course soon available on CD)
Telecommunications for ITS Professionals

The majority of these courses are available through ITS America, the National Highway Institute, or FHWA.

Summary of Short-Term Actions:

The TCB Subcommittee and the on-staff coordinator will work closely with LTAP and the local FHWA representative to:

- Schedule the identified courses through the appropriate offering agency/institute (NHI, ITSA, etc.);
- Promote the courses using the TCB web site, e-mail distribution lists, LTAP web site, flyers or agency newsletters, and word-of-mouth;
- Coordinate with local FHWA and MAG to determine the feasibility of federal-sponsorship, FHWA-MAG sponsorship or partial sponsorship to help offset local agency cost; and
- Promote the courses to other MPOs in Arizona (i.e., PAG, NACOG, etc.) if classroom space permits.

5.3 Special Courses and University Research Activities

With an established ITS community and ITS programs in the MAG region, several national courses, symposiums, and forums have recently been held in the Phoenix metropolitan area. Recent topics have included Telematics, ATIS Data Collection Standards, and Commercial Vehicles. These special courses are typically sponsored by national organizations (such as ITS America and ITE) and vary in terms of price and availability.

The role of the universities in Arizona in ITS capacity building is also critical. Several innovative research projects are in progress at the University of Arizona's ATLAS Research Center. These include in-depth research and applications in region-wide dynamic traffic management, incident detection and management, traffic adaptive algorithms, decision support systems, and logistics management. Arizona State University is offering certificate programs in ITS and transportation to supplement various Master's Degree programs. The activities at these institutions offer accessible and cost-effective opportunities for ITS professionals in the region to be on the cutting edge of new technologies and practices in the evolving ITS industry. Every effort should be made to coordinate with these programs and activities for seminars and supplemental in-depth courses to support regional TCB needs.

Summary of Short-Term Actions

- Advertise special courses and symposiums on the MAG TCB web page and encourage attendance by ITS professionals in the region.
- Coordinate with universities in the state to promote research projects and identify opportunities for seminars and specialized workshops in key research areas.

5.4 CD-ROM, Web-Based Training, and On-Line Resources

Materials of ITS PCB short courses and seminars can be downloaded in .pdf format, PowerPoint, viewed online, or provided as supplemental materials with CD-ROMs. These courses and seminars are designed to be used for informational purposes and offer important opportunities to build awareness on critical ITS topics. This cost-effective format allows for flexible training in a manner that is conducive to busy agency and individual schedules.

Interactive, on-line training courses are available through the Consortium for ITS Training and Education (CITE). These courses are individual modules of the full semester course "Fundamentals of ITS and Traffic Management." Each module varies in terms of cost and time required to complete (based on the complexity and information covered). Costs range from $60 to $400 per module, and the estimated time to complete each module ranges from four to fourteen hours. All of the modules listed below could be of benefit to various MAG partner agencies, and the modules marked with an * correspond to the priority training needs identified by the stakeholders:

- Introduction to Intelligent Transportation Systems*
- Introduction to Telecommunications Technology*
- Introduction to Information System Technology*
- The Tools of ATMS*
- Interoperability: ITS System Architecture and Standards*
- Corridor Management*
- Traffic Signal Systems Fundamentals*

The remaining on-line modules from the series also could be used for regional training and special interests as the need arises:

- Traffic Flow Theory
- Transportation Management
- Incident Management and Emergency Management
- Dynamic Route Guidance and In-Vehicle Systems

More specific information about the on-line courses above is available from http://www.citeconsortium.org

Downloadable presentations and documents on a wide range of ITS topics are available from several sources documented in Section 4, including the Joint Program Office, ITS America, and the Electronic Document Library. The Volpe/JPO web site provides downloadable presentation and course material from many of the recommended NHI courses listed in this plan. While this material does not replace many of the benefits of "live" classroom training, it is recommended that MAG obtain copies of relevant course presentations and supporting documents for the TCB library, as well as provide links to the following resources from its TCB web page:

http://www.itsa.org/educate.html

http://pcb.volpe.dot.gov/informational.asp

Summary of Short-Term Actions

- Identify and promote "alternatives" to training courses/workshops, such as new web-based courses, video training and other emerging training tools.
- Develop and maintain a centralized library of course materials for use by MAG partner agencies.
- Include links to ITS education and PCB-related web sites on the MAG TCB web page.

5.5 General Staffing Guidelines, Functions, and Recommended Competencies

As ITS continues to deploy and operate in the MAG region, several agencies are responsible for various ITS planning, implementation, operations, management and maintenance activities. Each agency in the region has its own staff classifications, required qualifications and specific responsibilities for ITS staff, and there is a need to establish general guidelines and recommended competencies for ITS staff across jurisdictions.

Through the survey, transportation professionals in MAG region have identified the competencies that will help them to manage both short-term and long-term ITS projects in the region. These competencies shall become part of requirements for new employee hiring and existing employee promotion criteria. For instance, TMC operators should also receive basic traffic engineering training to help them in traffic operation. The signal control course and traffic management courses are suitable for traffic engineering personnel from state, county, and local agencies involved in the technical aspects of traffic engineering. As part of professional training, the course list Sections 5.2 and 5.4 and in **Appendix B** can assist existing employees to receive up-to-date information to perform their jobs. They also serve as the basic knowledge requirements for hiring new employees in the region.

The JPO report "Building Professional Capacity in ITS: Guidelines for Staffing, Hiring, and Designing Ideal Project Teams" provides a comprehensive list of several types of agencies involved in regional ITS, and these agencies' typical ITS roles and activities. **Table 5.5-1** shows the JPO classifications as well as the corresponding MAG partner agencies:

Table 5.1-1 – JPO Classifications and Corresponding MAG Agency

JPO Agency Classification	MAG Agency
State Departments of Transportation	Arizona Department of Transportation
Transit Agencies	RPTA, Phoenix Transit, Etc.
Metropolitan Planning Organizations	Maricopa Association of Governments
City/County DOTs and Departments of Public Works	Maricopa County DOT City Traffic Engineering and Public Works
Transportation Management Centers	ADOT Traffic Operations Center MCDOT Traffic Management Center City TMCs/TOCs Public Safety Access Points (PSAPs)
Federal Agencies	Federal Highway Administration Federal Transit Administration

For each of the agencies listed, JPO report provides guidelines on typical ITS staff classifications, their anticipated function or responsibility, as well as recommended ITS competencies for that role. **Table 5.5-2** shows general staff categories that currently exist in the MAG region.

Table 5.5-2 – General ITS Staff Categories

Management	Planning	Operations	Maintenance
Program Manager* Project Manager* Operations Manager* TMC Manager*	Agency Planner ITS Specialist Interjurisdictional Coordinator	System Administrator/Support Technician TMC Operator Data Manager System Designer	Inspectors Maintenance Technicians

** Recommended requirement for professional certification*

Appendix C contains a comprehensive listing of JPO recommended classifications, roles/functions, and corresponding competencies.

As systems throughout the region continue to come on line and grow, additional staff as well as expanded staff capabilities will be required. These could include additional classifications of operators, traveler information-specific staff, expanded data management staff, system integrators, staff specializing in ITS awareness and outreach, etc. The MAG TCB Subcommittee can use the JPO guidelines to develop typical staff categories and desired qualifications and competencies to meet the needs of agencies in the region, including recommendations for staff that should have professional registration or certification. By outlining the desired competencies for ITS staff in the region, basic training needs for new and existing staff will be able to be quantified. This way, as new staff is hired, or specialized ITS staff becomes required in communities that do not currently operate or maintain ITS, agencies can use these guidelines as a teambuilding resource.

Summary of Short-Term Actions

- Using the JPO guidelines as a basis, develop general staff classifications, functions, and desired competencies, and corresponding courses that can be applied to the MAG region. The MAG ITS TCB Subcommittee should take the lead for this effort. These guidelines can be used as a reference for local agencies in staff hiring and training.
- The MAG ITS TCB Subcommittee should update the general staff classifications, functions, competencies and corresponding training recommendations as system growth requires new staff functions and new training materials become available over time.
- Encourage MAG partner agencies to refer to the classifications and training to ensure uniform capabilities of ITS staff throughout the region.

5.6 Funding the MAG ITS Training and Capacity Building Plan

Training is not often a high priority when local and regional agencies develop their annual operating budgets. It will be important for agencies in the MAG region to carefully consider the existing and future training needs of their ITS staff and plan for the training and professional capacity building that they need. This Plan has identified several workshops, courses, and on-line training tools that can be used by local agencies to build staff competencies in their ITS planning, operations, management and maintenance activities.

As the regional MPO, MAG can make a positive impact toward regional coordination of training activities. In the Implementation Plan of the MAG ITS Strategic Plan Update, MAG has been identified as the lead agency for ITS Training with a budget of $250,000 for years 2002-2006. It is recommended that this outreach funding be used to "jump start" the regional ITS TCB program to:

- Assign or hire an on-staff coordinator to serve as the point-of-contact for regional ITS TCB needs;
- Maintain a web page that will be used as a central clearinghouse for information about the regional TCB program (will require a monthly fee for server space if not set up as a page on an existing web server);
- Sponsor some of the regionally-significant courses and seminars identified in this plan that will address training needs of local ITS staff;
- Purchase CD and printed materials, compendiums, and other relevant information to be stored in a central TCB library for use by partner agencies; and
- Promote and advertise upcoming courses, new courses, and other pertinent information to a wide range of ITS staff and personnel in the region.

MAG can help to offset the costs of some of the TCB elements and requirements by:

- Working with FHWA to obtain federal sponsorship of identified courses;
- Coordinating with universities to hold seminars/symposiums about relevant ITS research programs in the state;
- Maximizing the use of on-line training resources, as well as on-line documents whenever possible; and
- Distributing information to stakeholders via e-mail alerts and notices rather than mailing flyers.

5.7 Long-Term TCB Strategies for the MAG Region

The long-term success of the MAG TCB Program will be dependent on many factors: a local TCB champion to spearhead and coordinate training activities; a commitment on the part of local agencies to make TCB an essential part of staff development and department operations; and continued updates to the TCB Program as ITS in the region expands and becomes more comprehensive. The short-term plan is intended to be flexible to respond to new courses and additional needs that might not have been identified as part of this planning effort.

For longer-term TCB considerations, it is recommended that:

- The TCB Program be evaluated and updated every two to four years to include additional staff classifications and additional courses and delivery methods as the needs for expanded learning grow with the regional systems;
- New courses and delivery methods that provide a cost-effective opportunity to address a specific or regional ITS need be incorporated into the Program as they are identified and become available; and
- Local agencies consider TCB an essential part of long-term operations, and include TCB activities in their respective management and operations budgets.

REFERENCES

1. Building Professional Capacity In ITS: Guidelines For Designing An Individualized Training And Education Plan; ITS/JPO, ITS/PCB Program, Technical Reports No: FHWA-OP-99-016, APR 1999.

2. Building Professional Capacity In ITS: Documentation And Analysis Of Training And Education Needs In Support Of ITS Deployment; ITS/JPO, ITS/PCB Program, Technical Reports No: FHWA-OP-99-015, APR 1999.

3. Building Professional Capacity In ITS: Guidelines On Developing The Future Transportation Professional; ITS/JPO, ITS/PCB Program, Technical Reports No: FHWA-OP-99-018, APR 1999.

4. Building Professional Capacity In ITS: Guidelines For Staffing, Hiring, And Designing Ideal Project Teams; ITS/JPO, ITS/PCB Program, Technical Reports No: FHWA-OP-99-017, APR 1999.

APPENDIX A

Table A1 – Ranking of Critical and Prioritized Knowledge Areas

Knowledge areas	A (% chosen)	B (% chosen)	C (% chosen)	Score = 100*(A+B+C)/3	Rank
12. Cost/Benefit Analysis	67	50	67	61	1
1. Regional Concept of Operations	67	17	83	56	2
11. Technology Analysis – Range of Options	67	50	50	56	2
5. ITS Projects in the MPO Regional Trans. Plan/TIP	83	17	50	50	4
23. System Integration	67	17	50	45	5
25. Capacity Analysis – Transmission: Wireline v. Wireless	67	33	33	44	6
15. Sources of Funding – Fed/State/Local/Private	33	17	67	39	7
16. Writing Specifications – Technical and Legal Issues	50	17	50	39	7
20. System Analysis and Design	33	33	50	39	7
26. Lease / Build Decision Making	67	33	17	39	7
39. Project Evaluation	50	0	67	39	7
21. Consistency with National ITS Architecture and Standards	17	17	67	34	12
4. Comparing/Combining ITS and Capital Improvements	50	0	50	33	13
7. Data Sharing between Agencies	33	17	50	33	13
17. Procurement Options: Design / Build / Lease Agreements, Shared Resources Agreements and RFPs	33	0	67	33	13
18. Managing Software Development and Costs	33	33	33	33	13
34. Liability Issues	67	0	33	33	13
37. Software/Data Maintenance	50	17	33	33	13
9. Partnerships – Structuring/Public/Private Agreements	17	17	50	28	19
10. Public Relations	33	0	50	28	19
13. Analysis of Existing ITS Infrastructure	33	0	50	28	19
14. Using the National ITS Architecture for Planning	17	0	67	28	19
28. Use of Prototypes	33	0	50	28	19
2. Identifying Organizational Barriers and Managing Change	33	17	17	22	24
19. Managing Contractors: Developers and System Integrators	33	17	17	22	24
27. Acceptance Testing	17	33	17	22	24
30. Operations Center Staffing Requirements	50	0	17	22	24
31. Management of an Operations Center	33	17	17	22	24
32. Human Factors	33	0	33	22	24
33. Privacy of Data and Identification	0	17	50	22	24
35. Security Systems & Network Vulnerability	17	17	33	22	24
22. Requirements Management	33	0	17	17	32
36. Intellectual Property Rights	17	0	33	17	32
38. Inspection Procedures for ITS equipment / systems	33	0	17	17	32
6. Developing a Business Plan	17	0	17	11	35
24. Quality Assurance	17	0	17	11	35
29. Training	17	0	17	11	35
8. Risk Management	17	0	0	6	38
3. Coalition Building with New Stakeholders	0	0	0	0	39

Column A = For checkmarks indicating knowledge areas critical to interviewee's position.
Column B = For ranking knowledge areas (the top five are chosen).
Column C = For checkmarks indicating knowledge areas critical to ITS in general, from interviewee's perspective.

APPENDIX B

ITS Training and Capability Building Courses for Short-Term Strategy

Note: The fees listed in this section are for sponsorship by the Federal government for public highway and transportation agencies. Courses sponsored by a private entity will be charged a higher course fee. The course fees listed are subject to change.

❑ Cost/Benefit Analysis

NHI Course 15268 (under development for late 2000): ITS Deployment Analysis Systems (IDAS)			
COURSE FEE	To be determined		
LENGTH	2 Days (CEU: 1.2 Units)	TYPE	Classroom Computer Training
CLASS SIZE	Minimum 20; Maximum 30		
DESCRIPTION	This is a new course that will be a hands-on computer training session on the newly developed ITS Deployment Analysis System (IDAS) software. IDAS provides ITS sketch planning capability to calculate the relative costs and benefits of ITS investments.		
COURSE SCHEDULING	Lynn Cadarr (703) 235-0528 e-mail: lynn.cadarr@fhwa.dot.gov		
TECHNICAL INFORMATION	Gene McHale (703) 285-2973 e-mail: gene.mchale@fhwa.dot.gov		

NHI Course 13604: Intelligent Transportation Systems (ITS) and the Transportation Planning Process Web site: http://www.nhi.fhwa.dot.gov/			
COURSE FEE	$2,500		
LENGTH	1 Day (CEU: 0.6 Units)	TYPE	Classroom Instruction
CLASS SIZE	30		
DESCRIPTION	The course identifies key success factors for implementing ITS over time. The course covers topics such as transportation plans and programs, system performance criteria, benefit cost analysis, financial planning, and working with the private sector. Case study information on the development of ITS in specific areas of the U.S. is included.		
COURSE SCHEDULING	Lynn Cadarr (703) 235-0528 e-mail: lynn.cadarr@fhwa.dot.gov		
TECHNICAL INFORMATION	Sheldon Edner (202) 366-4066 e-mail: sheldon.edner@fhwa.dot.gov		

❑ Regional Concept of Operations

NHI Course 13375: Freeway Traffic Operations Web Site: http://pcb.volpe.dot.gov/schedule.asp			
COURSE FEE	$5,000/$8,000		
LENGTH	3 or 5 days	TYPE	Classroom Instruction
CLASS SIZE	N/A		
DESCRIPTION	This course covers basic traffic flow theory for freeways, evaluating freeway operations during project development and design, freeway traffic control systems, traffic control systems, traffic management centers, and operations analysis procedures for freeways		
COURSE SCHEDULING	Lynn Cadarr 703-235-0528 e-mail: lynn.cadarr@fhwa.dot.gov		
TECHNICAL INFORMATION	Lynn Cadarr 703-235-0528		

NHI Course 13602/13607: Deploying Integrated Intelligent Transportation Systems (ITS) – Metropolitan/Rural **Web site: http://www.nhi.fhwa.dot.gov/**			
COURSE FEE	$5,000		
LENGTH	3 Days (CEU: 1.8 Units)	TYPE	Classroom Instruction
CLASS SIZE	30		
DESCRIPTION	The regional context in which the public components of ITS infrastructure will be implemented and integrated is emphasized. The course combines the technical and institutional components of integrated ITS infrastructure. The importance of each component is discussed and placed in context with the regional decision that must be made by State and local agencies.		
COURSE SCHEDULING	Lynn Cadarr (703) 235-0528 e-mail: lynn.cadarr@fhwa.dot.gov		
TECHNICAL INFORMATION	Larry Swartzlander (202) 366-6066 e-mail: larry.swartzlander@fhwa.dot.gov		

NHI Course 13310: Computerized Traffic Signal Systems			
COURSE FEE	$6,500		
LENGTH	4 Days (CEU: 2.4 Units)	TYPE	Classroom Instruction
CLASS SIZE	40		
DESCRIPTION	This course presents current technology and control options available for computerized traffic control, including microcomputer applications. The course covers the technical issues of a computerized traffic control system and steps necessary to develop and manage a system. These steps begin with problem identification, followed by a feasibility study, control system design, installation, maintenance and, finally, operation and system evaluation.		
COURSE SCHEDULING	Lynn Cadarr (703) 235-0528 e-mail: lynn.cadarr@fhwa.dot.gov		
TECHNICAL INFORMATION	Pamela Crenshaw (202) 366-1482 e-mail: pamela.crenshaw@fhwa.dot.gov		

❑ Technology Analysis – Range of Options

ITE Course: NTCIP and ITS Standards – What Do They Mean for You?			
COURSE FEE	To be determined		
LENGTH	1 Day	TYPE	Workshop
CLASS SIZE	N/A		
DESCRIPTION	This seminar provides critical information to transportation and traffic engineers on the National Transportation Communications for ITS Protocol (NTCIP), as well as an overview of other ITS standards for traffic management systems		
COURSE SCHEDULING	Russell Houston, ITE (202)554-8050 ext. 144 e-mail: rhouston@ite.org		
TECHNICAL INFORMATION	Russell Houston, ITE (202)554-8050 ext. 144 e-mail: rhouston@ite.org		

NTI Course: Procuring New Technologies for Transit			
COURSE FEE	To be determined		
LENGTH	2 Days	TYPE	Classroom Instruction
CLASS SIZE	N/A		
DESCRIPTION	This course will give you the insights and skills to make a successful new technology procurement. These skills and techniques are applicable to any new technology whether it is buses and railcars or GIS and AVL systems.		
COURSE SCHEDULING	Eric Bruun, (732) 932-1700 ext. 18, e-mail: ebruun@rci.rutgers.edu		
TECHNICAL INFORMATION	Eric Bruun, (732) 932-1700 ext. 18, e-mail: ebruun@rci.rutgers.edu		

ITSA Course: Telecommunications for ITS Professionals Web Site: www.itsa.org			
COURSE FEE	ITS America Members: $600; Non-members: $700		
LENGTH	2 Days	TYPE	Classroom Instruction
CLASS SIZE	N/A		
DESCRIPTION	This course is designed to develop the student's understanding of communications technologies, applications, and design requirements.		
COURSE SCHEDULING	Ria Melendez, ITS America (202)484-4547 e-mail: rmelendez/ITS@its.org		
TECHNICAL INFORMATION	Ria Melendez, ITS America (202)484-4547 e-mail: rmelendez/ITS@its.org		

NHI Course 13620: Lessons in Intelligent Transportation Systems (ITS) Procurement Web site: http://www.nhi.fhwa.dot.gov/			
COURSE FEE	No Fee		
LENGTH	1 Day (CEU: 0.6 Units)	TYPE	Workshop
CLASS SIZE	Minimum 20; Maximum 30		
DESCRIPTION	This seminar is intended to heighten awareness of the challenges in procuring ITS within the traditional construction project environment.		
COURSE SCHEDULING	Lynn Cadarr (703) 235-0528 e-mail: lynn.cadarr@fhwa.dot.gov		
TECHNICAL INFORMATION	William S. Jones (202) 366-2128 e-mail: William.jones@fhwa.dot.gov		

CITE Course: ITS Applications and Traffic Management (available in January 2001) Web Site: http://www.citeconsortium.org			
COURSE FEE	$950, or alternatively students can take individual modules of the course on-line		
LENGTH	Semester long	TYPE	Classroom Web-Based
CLASS SIZE	N/A		
DESCRIPTION	This course consists of 12 individual modules each addressing a different aspect of Intelligent Transportation Systems (ITS).		
COURSE SCHEDULING	Kathleen Frankle, CITE (410)414-2925 e-mail: kfrankle@chesapeake.net		
TECHNICAL INFORMATION	Kathleen Frankle, CITE (410)414-2925 e-mail: kfrankle@chesapeake.net		

❑ ITS Projects in the MPO Regional Transportation Plan/TIP

NTI Course **Intelligent Transportation Systems for Transit: Solving Real Problems**			
COURSE FEE	To be determined		
LENGTH	2 Days	TYPE	Classroom Instruction
CLASS SIZE			
DESCRIPTION	*Solving ITS for Transit: Real Problems* covers two large issues for organizations considering technologies investments. First, it takes a very practical look at the most common uses of technology in transit and the ways technologies may be used (or not used!) to perform common tasks. Second, the course shows you how to evaluate whether it is worthwhile to pursue a particular technology investment and how to choose among alternative investment opportunities using various types of cost/benefit analysis techniques. Attentions are paid to the identification and analysis of costs, benefits, and risks of transit ITS applications. Also, you will learn the basics of discounting and how to do various types of cost/benefit analyses.		
COURSE SCHEDULING	Eric Bruun, (732) 932-1700 ext. 18, e-mail: ebruun@rci.rutgers.edu		
TECHNICAL INFORMATION	Eric Bruun, (732) 932-1700 ext. 18, e-mail: ebruun@rci.rutgers.edu		

NHI Course 13602: Deploying Integrated Intelligent Transportation Systems (ITS) – Metropolitan **Web site: http://www.nhi.fhwa.dot.gov/**			
COURSE FEE	$5,000		
LENGTH	3 Days (CEU: 1.8 Units)	TYPE	Classroom Instruction
CLASS SIZE	30		
DESCRIPTION	The regional context in which the public components of ITS infrastructure will be implemented and integrated is emphasized. The course combines the technical and institutional components of integrated ITS infrastructure. The importance of each component is discussed and placed in context with the regional decision that must be made by state and local agencies.		
COURSE SCHEDULING	Lynn Cadarr (703) 235-0528 e-mail: lynn.cadarr@fhwa.dot.gov		
TECHNICAL INFORMATION	Larry Swartzlander (202) 366-6066 e-mail: larry.swartzlander@fhwa.dot.gov		

NTI Course: Statewide and Metropolitan Transportation Programming **Web Site: http://www.policy.rutgers.edu/nti/cat.htm**			
COURSE FEE	Free to employees of federal, state, and local government and private non-profit transit operators. $450 for all others, including contractors and consultants to transit operators.		
LENGTH	2.5 Days	TYPE	Classroom Instruction
CLASS SIZE	30		
DESCRIPTION	This course provides instruction on the metropolitan and statewide programming processes required under ISTEA, the federal transportation planning regulations, and the variety among state programming processes including typical legal, political, and traditional process constraints, as well as aspects of local programming. Topics will focus on development of the metropolitan Transportation Improvement Program (TIP) and the Statewide TIP (STIP).		
COURSE SCHEDULING	Eleanor J. Edwards (732)932-1700 (extension 13)		
TECHNICAL INFORMATION	Eleanor J. Edwards (732)932-1700 (extension 13)		

NHI Course 13628: Intelligent Transportation Systems (ITS) and Transit Management Web site: http://www.nhi.fhwa.dot.gov/ and/or http://www.policy.rutgers.edu/nti			
COURSE FEE	Free		
LENGTH	2 Days (CEU: 1.2 Units)	TYPE	Classroom Instruction
CLASS SIZE	30		
DESCRIPTION	This course expands on the ITS in Transit course presenting additional details on the integration of highway and transit ITS, and the benefits of applying ITS technologies. Highway professionals will benefit in learning more of how including transit in regional plans will support the solution to transportation congestion.		
COURSE SCHEDULING	For more information and courses available on Transit and ITS contact Erick Bruun with the National Transit Institute at (732) 932-1700 extension 18. Their web site is http://policy.rutgers.edu/nti. ITS courses and information are found under Advanced Technology and Innovative Practices.		
TECHNICAL INFORMATION			

❑ System Integration

NHI Course 13602/13607: Deploying Integrated Intelligent Transportation Systems (ITS) – Metropolitan/Rural Web site: http://www.nhi.fhwa.dot.gov/			
COURSE FEE	$5,000		
LENGTH	3 Days (CEU: 1.8 Units)	TYPE	Classroom Instruction
CLASS SIZE	30		
DESCRIPTION	This course supports integrated intelligent transportation system infrastructure deployment with consideration of the National ITS Architecture. It covers issues in metropolitan area.		
COURSE SCHEDULING	Lynn Cadarr (703) 235-0528 e-mail: lynn.cadarr@fhwa.dot.gov		
TECHNICAL INFORMATION	Larry Swartzlander (202) 366-6066 e-mail: larry.swartzlander@fhwa.dot.gov		

CITE Course : Interoperability – ITS System Architecture and Standards Web Site: http://www.citeconsortium.org			
COURSE FEE	$275 per person		
LENGTH	2 ½ hours equivalent classroom time and 5 hours extra course work	TYPE	Web-Based
CLASS SIZE	N/A		
DESCRIPTION	This course is intended to provide an understanding of the ITS national architecture and its relationship to systems engineering principles.		
COURSE SCHEDULING	Kathleen Frankle, CITE (410)414-2925 e-mail: kfrankle@chesapeake.net		
TECHNICAL INFORMATION	Kathleen Frankle, CITE (410)414-2925 e-mail: kfrankle@chesapeake.net		

NHI Course 13617: Shared Resources For Telecommunications Web site: http://www.nhi.fhwa.dot.gov/			
COURSE FEE	$2,500		
LENGTH	1 Day (CEU: 0.6 Units)	TYPE	Classroom Instruction
CLASS SIZE	30		
DESCRIPTION	This course discusses issues and key decisions to be addressed by senior transportation officials and project managers when considering shared resource arrangements.		
COURSE SCHEDULING	Lynn Cadarr (703) 235-0528 e-mail: lynn.cadarr@fhwa.dot.gov		
TECHNICAL INFORMATION	Pete Mills (703) 285-2402 e-mail: pete.mills@fhwa.dot.gov		

FHWA Course: Integrated Transportation Information System			
COURSE FEE	Free		
LENGTH	3 Days	TYPE	Classroom Instruction
CLASS SIZE	N/A		
DESCRIPTION	It is the fusion of all transportation information into a simple and comprehensive information architecture to best support transportation agency business purposes. Essentially, ITIS strives to integrate four areas common to all transportation agencies: (1) The Organization (staff, structure, responsibilities), (2) Business Processes (functions, data flow, operations), (3) Data (access, standards, ownership), and (4) Technology (software, hardware, architecture.) The workshop explains the benefits of integrating information and the practical aspects of building and maintaining an ITIS. They examine the changing needs of agencies, and present available tools, technologies, techniques, methodologies, and frameworks to aid in establishing a more integrated information environment.		
COURSE SCHEDULING	Roger Petzold, Office of Intermodal and Statewide Planning (202)366-4074 e-mail: roger.petzold@fhwa.dot.gov		
TECHNICAL INFORMATION	Roger Petzold, Office of Intermodal and Statewide Planning (202)366-4074 e-mail: roger.petzold@fhwa.dot.gov		

ITSA Course: System Integration for ITS Professionals Web Site: www.itsa.org			
COURSE FEE	ITS America Members: $600; Non-members: $700		
LENGTH	2 Days	TYPE	Classroom Instruction
CLASS SIZE	30		
DESCRIPTION	This course will cover specification development, work statements, procurement process; systems engineering for ITS projects, institutional barriers, and ITS project management.		
COURSE SCHEDULING	Ria Melendez, ITS America (202)484-4547 e-mail: rmelendez/ITS@its.org		
TECHNICAL INFORMATION	Ria Melendez, ITS America (202)484-4547 e-mail: rmelendez/ITS@its.org		

❑ Capacity Analysis – Transmission: Wireline v. Wireless

NHI Course 13605: Intelligent Transportation Systems (ITS) Telecommunications Overview **Web site: http://www.nhi.fhwa.dot.gov/**			
COURSE FEE	$2,500		
LENGTH	1 Day (CEU: 0.6 Units)	TYPE	Classroom Instruction
CLASS SIZE	30		
DESCRIPTION	This course is designed to introduce the fundamentals of wireline and wireless telecommunications systems. The course concludes with a brief discussion of the telecommunications technology acquisition process.		
COURSE SCHEDULING	Lynn Cadarr (703) 235-0528 e-mail: lynn.cadarr@fhwa.dot.gov		
TECHNICAL INFORMATION	Pete Mills (703) 285-2402 e-mail: pete.mills@fhwa.dot.gov		

COLLEGE Course (provided by Rensselaer Polytechnic Institute): Wireless Technology for ITS			
COURSE FEE	Contact Rensselaer Polytechnic Institute		
LENGTH	Contact Rensselaer Polytechnic Institute	TYPE	Classroom Computer Training
CLASS SIZE	Contact Rensselaer Polytechnic Institute		
DESCRIPTION	Educational module designed as a primer on wireless communication. Utilizes interactive multimedia technology. Will be available on CD-ROM		
COURSE SCHEDULING	William A. Wallace, email: wallaw@rpi.edu		
TECHNICAL INFORMATION	William A. Wallace, email: wallaw@rpi.edu		

ITSA Course: Telecommunications for ITS Professionals Web Site: www.itsa.org			
COURSE FEE	ITS America Members: $600; Non-members: $700		
LENGTH	2 Days	TYPE	Classroom Instruction
CLASS SIZE	N/A		
DESCRIPTION	This course is designed to develop the student's understanding of communications technologies, applications, and design requirements.		
COURSE SCHEDULING	Ria Melendez, ITS America (202)484-4547 e-mail: rmelendez/ITS@its.org		
TECHNICAL INFORMATION	Ria Melendez, ITS America (202)484-4547 e-mail: rmelendez/ITS@its.org		

Complete List of Courses for Knowledge Areas Classified as High Priority Need:

12. Cost/Benefit Analysis
1. Regional Concept of Operations
11. Technology Analysis – Range of Options
5. ITS Projects in the MPO Regional Trans. Plan/TIP
23. System Integration
25. Capacity Analysis – Transmission: Wireline v. Wireless

Knowledge Area: Cost/Benefit Analysis

- NHI Course 13405: Value Engineering Workshop
- NTI Course: Intelligent Transportation Systems for Transit: Solving Real Problems
- NHI Course 13604: Intelligent Transportation Systems (ITS) and the Transportation Planning Process
- NHI Course 13618: Intelligent Transportation Systems (ITS) Telecommunications Analysis
- NHI Course Number 15268 (under development for late 2000): ITS Deployment Analysis Systems (IDAS)

Knowledge Area: Regional Concept of Operations

- NHI Course 13375: Freeway Traffic Operations
- NHI Course 13332: Developing Traffic Control Strategies
- NHI Course 13310: Computerized Traffic Signal Systems
- NHI Course 13348: Incident Management
- NHI Course 13602: Deploying Integrated Intelligent Transportation Systems (ITS) – Metropolitan
- NHI Course 13607: Deploying Integrated Intelligent Transportation Systems (ITS) – Rural
- NHI Course 13613: Using the National ITS Architecture for Deployment (Public)
- NHI Course 15269 (under development for late 2000): Introduction to Metropolitan Planning

Knowledge Area: Technology Analysis – Range of Options

- NHI Course 13605: Intelligent Transportation Systems (ITS) Telecommunications Overview

- NHI Course 13620:Lessons in Intelligent Transportation Systems (ITS) Procurement
- NHI Course 13637: Understanding ITS/CVO Technology Applications
- CITE Course: ITS Applications and Traffic Management (available in January 2001)
- ITE Course: NTCIP and ITS Standards – What Do They Mean for You?
- ITSA Course: Telecommunications for ITS Professionals
- ITSA Course: Sensors, Data Exchange and Interoperability
- NTI Course: Procuring New Technologies for Transit
- NTI Course: A Systematic Approach for Adopting New Technologies
- FHWA Course: Advanced Transportation Management Technology Workshop

Knowledge Area: ITS Projects in the MPO Regional Trans. Plan/TIP

- NHI Course 13604: Intelligent Transportation Systems (ITS) and the Transportation Planning Process
- NTI Course: Statewide and Metropolitan Transportation Programming
- NTI Course: Intelligent Transportation Systems for Transit: Solving Real Problems
- NHI Course 13601- Intelligent Transportation Systems (ITS) Awareness Seminar
- NHI Course 13602: Deploying Integrated Intelligent Transportation Systems (ITS) – Metropolitan
- NHI Course 13612: Introduction to National Intelligent Transportation System (ITS) Architecture and Interim Guidance on Conformity
- NHI Course 13613: Using the National ITS Architecture for Deployment (Public)
- NHI Course Number 13620:Lessons in Intelligent Transportation Systems (ITS) Procurement
- NHI Course 13628: Intelligent Transportation Systems (ITS) and Transit Management

Knowledge Area: System Integration

- ITSA Course: System Integration for ITS Professionals
- CITE Course : Interoperability – ITS System Architecture and Standards (available in January 2001)
- NHI Course 13601: Intelligent Transportation Systems (ITS) Awareness Seminar
- NHI Course 13602: Deploying Integrated Intelligent Transportation Systems (ITS) – Metropolitan
- NHI Course 13607: Deploying Integrated Intelligent Transportation Systems (ITS) – Rural
- NHI Course 13617: Shared Resources For Telecommunications
- FHWA Course: Integrated Transportation Information System
- ITSA Course: Intermodal Freight Operations and ITS

Knowledge Area: 25. Capacity Analysis – Transmission: Wireline v. Wireless

- NHI Course 13605: Intelligent Transportation Systems (ITS) Telecommunications Overview
- ITSA Course: Telecommunications for ITS Professionals
- NHI Course 13618: Intelligent Transportation Systems (ITS) Telecommunications Analysis
- NHI Course 13617: Shared Resources For Telecommunications
- ITE Course: NTCIP and ITS Standards – What Do They Mean for You?
- COLLEGE Course (provided by Rensselaer Polytechnic Institute): Wireless Technology for ITS
- FHWA Course: Integrated Transportation Information System

APPENDIX C